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REMARKS

Claims 1-20 are still pending in the application.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over a proposed combination of Kringlebotn (United States Patent No. 6,097,487) in view of Farhadiroushan (United States Patent No. 5,754,293).

It is respectfully submitted that the proposed combination of Kringlebotn in view of Farhadiroushan does not teach or suggest an optical system featuring a chirped Bragg grating etalon that responds to a broadband optical signal, for providing a chirped Bragg grating etalon optical signal having a precise set of optical reference signals, as recited in claim 1, for the following reasons:

The reasoning on pages 2-3 of the Office Action recognizes that Kringlebotn discloses a wavelength measurement device for measuring Bragg grating wavelengths of several multiplexed FBGs having individual fiber Bragg gratings 6 with respective wavelengths λ_1 , λ_2 , λ_3 and an individual reference grating 5 with a wavelength λ , as shown in Figure 1. When describing the embodiment shown in Figure 1, Kringlebotn, column 4, lines 49-50, states that:

"The main part of the light is passed onto the FBGs 6, including 'at least one FBG 5' with a known wavelength, providing an accurate wavelength reference, via another directional coupler 4." [Bold emphasis provided]

The reasoning on pages 2-3 of the Office Action points to this sentence in Kringlebotn and states that:

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"This comment still leaves doubt as to whether each of the multiple Bragg gratings in an etalon structure would actually have the same known wavelength." [Bold emphasis provided]

Foremost, it is respectfully submitted that the undersigned attorney honestly does not understand what the aforementioned "still leaves doubt as to" sentence really means within the context of this Office Action. Nevertheless, it appears to give the impression that Kringlebotn's statement in column 4, lines 49-50, is being misinterpreted and/or misapplied in the reasoning on pages 2-3 of the Office Action, as well as in the "Response to Arguments" section of the Office Action on page 4, second full paragraph, for the following reasons:

First, it is respectfully submitted that Kringlebotn's statement in column 4, lines 49-50, appears to be misinterpreted, because a person skilled in the art would appreciate that each of the multiple Bragg gratings in an etalon structure would actually have the same known wavelength.² In view of this, it is not understood by the undersigned attorney how Kringlebotn's statement in column 4, lines 49-50, raises or leaves any doubt in relation to this issue.

² As remarked in Applicant's December 5th Amendment, a person skilled in the art would appreciate that an etalon configuration has two identical Bragg gratings (i.e. having identical wavelengths) in a series in an optical fiber, as set forth in the Amendment submitted on December 5, 2002. In operation, optical light having the wavelength of the Bragg grating pair reflects back and forth between the identical Bragg grating pair. Page 261 from "Fiber Bragg Gratings", by Othonos et al defines an etalon, a copy of which was submitted in Applicant's December 5th Amendment.

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Second, it is respectfully submitted that Kringlebotn's statement in column 4, lines 49-50, appears to be misinterpreted and/or misapplied, based on the fact that the "at least one" language appears to be incorrectly being relied on to support the position that this language would motivate one of ordinary skill in the art to look to Farhadiroushan to make up for the deficiency in teaching of Kringlebotn so as to try to substitute/modify two FBGs having identical wavelengths in Farhadiroushan for one of Kringlebotn's individual fiber Bragg gratings so as to form an etalon configuration. However, the "at least one" language is clearly describing the FBG 5 in Figure 1 of Kringlebotn, which must be interpreted consistent with that shown in Figure 5, where the "at least one FBG 5" is shown and described as a pair of separate reference FBGs 5a, 5b having completely different reference wavelengths 1.55 and 1.3 microns. See Kringlebotn, the paragraph bridging columns 5-6. Clearly, Kringlebotn's pair of separate reference FBGs 5a, 5b in Figure 5 having the completely different reference wavelengths 1.55 and 1.3 microns neither individually nor together form an etalon configuration. Moreover, Kringlebotn's pair of separate reference FBGs 5a, 5b in Figure 5 having the completely different reference wavelengths 1.55 and 1.3 microns is not even remotely suggestive of the formation of an etalon configuration. In view of this, it is respectfully submitted that Kringlebotn's statement on column 4, lines 49-50, leaves no doubt that

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Kringlebotn's two or more Bragg gratings 5a, 5b have different known wavelengths, so as not to form, and/or so as not to be suggestive of the formation of, an etalon having FBGs with identical wavelengths. For these reasons, it is respectfully submitted that Kringlebotn's statement on column 4, lines 49-50, cannot be interpreted or applied to support the position that the "at least one" language would motivate one of ordinary skill in the art to look to Farhadiroushan to make up for the deficiency in the teaching of Kringlebotn so as to try to substitute/modify two FBGs having identical wavelengths in Farhadiroushan for one of Kringlebotn's individual fiber Bragg gratings so as to form an etalon configuration, as claimed, which the aforementioned "still leaves doubt as to" sentence appears to be suggesting. In fact, quite to the contrary, if anything the subject matter shown and described in relation to Kringlebotn's Figure 5 expressly teaches away from using pairs of FBGs having identical wavelengths such as that taught by Farhadiroushan when the subject matter of Figure 5 of Kringlebotn is properly interpreted and applied.

The 2nd Substitution/Modification

Moreover still, it is respectfully submitted that the aforementioned substitution/modification alone in the proposed combination clearly does not result in the claimed invention, because one of ordinary skill in the art would still have to

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further modify the proposed combination to substitute chirped Bragg gratings in place of the pair of FBGs shown and described in Farhadiroushan so as to form the chirped fiber Bragg grating etalon configuration, as claimed herein.

However, for reasons set forth in the patent application on pages 1-2 the use of a chirped Bragg gratings etalon configuration in the manner recited in the claimed invention provides an important contribution to the state of the art, the need or provision of which not recognized by the prior art and thus would not be obvious to one of ordinary skill in the art. For example, pages 1-2 of the patent application set forth the problem in the art being addressed by the inventors of the claimed invention. In summary, the use of an etalon formed by broadband fiber Bragg grating pairs as shown in Figure 1 of the patent application results in a very limited set of resonant frequencies, as described in the patent application on page 2, line 20, through page 3, line 3. For example, if a resonant optical frequency is outside a very limited region, the light will pass through the fiber Bragg grating etalon cavity unaffected. For a set of reference optical frequencies, the unaffected light is most undesirable and would merely result in the provision of a very limited spectrum of optical reference signals. The use of a multiplicity of etalons formed from a series of broadband fiber Bragg grating pairs in order to overcome this problem raises a whole different set of problems,

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including issues related to the differing temperature sensitivities of the multiplicity of etalons formed from the broadband fiber Bragg grating pairs.

The inventors recognized this problem in the art and provided a solution to the same. To solve this problem, the inventors designed an optical system featuring a chirped Bragg grating etalon that responds to a broadband optical signal, for providing a chirped Bragg grating etalon optical signal having a precise set of optical reference signals, as recited in claim 1. The precise set of the optical reference signals includes a series of peaks covering most of a source spectral width of the broadband source with the power at the beginning and end of the spectrum of the broadband source passed substantially unaffected by the chirped Bragg grating etalon, as recited in dependent claim 20.

In effect, the whole thrust of the claimed invention is to use a broadband source in combination with a single chirped Bragg grating etalon in order to provide a precise set of optical reference signals having a broad spectrum of frequencies of interest. As a person skilled in the art would appreciate, the use of the chirped Bragg grating etalon to provide the desired series of peaks covering most of the source spectral width of the broadband source substantially eliminates the differing temperature sensitivities problem that might otherwise occur with the use of the multiplicity of etalons formed from the broadband

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fiber Bragg grating pairs like that of the prior art shown in Figure 1 of the patent application.

It is respectfully submitted that none of the cited prior art references, or any other prior art on the record, either recognizes the aforementioned problem in the art, or even remotely suggests a solution thereto, especially the use of a Bragg grating chirped etalon to solve the same. For all these reasons, the prior art does not teach or suggest the further substitution of chirped bragg gratings in place of the pair of FBGs shown and described in Farhadiroughan so as to form the chirped fiber Bragg grating etalon configuration, as claimed herein.

Dependent Claims 2-15 and 20

Claims 2-15 and 20 depend from claim 1, contain all the limitations therein, and are deemed patentable over the cited prior art for the reasons set forth above.

Claims 16-19

For substantially similar reasons, claims 16-19 are deemed patentable over the proposed combination.


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Conclusion

For these reasons, it is respectfully requested that the obviousness rejection be reconsidered and withdrawn.

Reconsideration and early allowance of all the claims is respectfully requested.

Respectfully submitted,



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